

# bbftp

## Category: File Transfers

### DRAFT

This article is being reviewed for completeness and technical accuracy.

### When and Why to use bbFTP

If your data is being transferred to or from a NAS system over the wide area network, scp will almost always be the limiting factor, due to the static TCP windowing defined in the OpenSSH (versions older than 4.7) source code. The Bandwidth Delay Product (BDP) states that the bandwidth of the pipe multiplied by the latency gives the optimal window size for data transfer. With the window size statically defined for lower-speed networks, scp can never properly utilize the bandwidth available. bbFTP has dynamically adjustable window sizes (up to the maximum allowed by the system) and can also transmit multiple simultaneous streams of data. We have found that this application provides the best mechanism for making use of the bandwidth available between two sites.

Things to check:

- Are you using scp to transfer files?
- Are you transferring files to an offsite location? (outside NAS or NASA Ames)
- Is the average delay between sites larger than 30 ms?
- Is the data being transferred in large files (1 GB+)?

If the answer to all of these is 'Yes', then the bbFTP application will improve data transfer rates. Please follow the guide below to get started.

### Downloading bbFTP

bbFTP has been tested to work on many operating systems: Linux, IRIX, Solaris, BSD and MacOSX. Other systems may also be supported.

If you intend to initiate bbFTP from your localhost, you will need to install the bbFTP client on your localhost. If you intend to initiate bbFTP from a NAS host, you will need to install the bbFTP server on your localhost.

- bbFTP for Linux, IRIX, Solaris, and BSD

For Linux, IRIX, Solaris, and BSD systems, the bbFTP application can be downloaded from its distribution site [IN2P3](#) in France. For your convenience, the latest version is available here.

[Download latest client version - bbftp-client-3.2.0 \(GZ compressed file - 232 KB\)](#)

[Download latest server version - bbftp-server-3.2.0 \(GZ compressed file - 220 KB\)](#)

- **bbFTP for MacOSX**

[Download latest client version with fixes for MacOSX \(binary - 252KB\)](#)

[Download latest server version with fixes for MacOSX \(binary - 192KB\)](#)

## **Installing bbFTP**

If you download a source code distribution, follow the instruction below to build and install bbFTP. This guide covers the client setup only. Installing the server version is similar.

```
your_localhost% tar -zxvf bbftp*
your_localhost% cd bbftp*/bbftpc (or bbftp*/bbftpd for the server version)
your_localhost% ./configure
your_localhost% make
your_localhost% make install (optional, requires root privileges to install)
```

By default, the application will install in /usr/local/bin. If you do not have admin privileges, you may skip the last step and copy the bbFTP binary to your home directory, or run it from the current location.

## **Using bbFTP**

To write the version of bbftp and default values to standard output:

```
bbftp -v
```

For example:

```
pfel% bbftp -v
bbftp version 3.2.0
Compiled with : default port 5021
               compression with Zlib-1.2.3
               encryption with OpenSSL 0.9.8a 11 Oct 2005
               default ssh command = ssh -q
               default ssh remote command = bbftpd -s
               default number of tries = 5
               default sendwinsize = 256 Kbytes
               default recvwinsize = 256 Kbytes
               default number of stream = 1
```

To request the execution of commands contained in the control file `ControlFile` or the `ControlCommands` using `RemoteUsername` on `RemoteHost`:

```
bbftp [Options] [-u RemoteUsername] -i ControlFile [RemoteHost]
bbftp [Options] [-u RemoteUsername] -e ControlCommands [RemoteHost]
```

Notice that `-i` or `-e` option are mandatory. The examples given in this article all use `-e ControlCommands`.

Available options are:

```
[-b (background)]
[-c (gzip compress)]
[-D[min:max] (Domain of Ephemeral Ports) ]
[-f errorfile]
[-E server command for ssh]
[-I ssh identity file]
[-L ssh command]
[-s (use ssh)]
[-S (use ssh in batch mode)]
[-m (special output for statistics)]
[-n (simulation mode: no data written)]
[-o outputfile]
[-p number of // streams]
[-q (for QBSS on)]
[-r number of tries ]
[-R .bbftprc filename]
[-t (timestamp)]
[-V (verbose)] will print out the transfer rate
[-w controlport]
[-W (print warning to stderr) ]
```

For more information about each option, see **man bbftp**. Those used in the examples will be briefly described.

### *Single stream vs multiple streams*

- Single stream:

Using single stream is the easiest, but may not provide optimal performance.

In the examples below, `bbFTP` is run from the current working directory. If it was installed in a system path location, the `./` may be omitted.

The `-s` option says to use `ssh` to remotely start a `bbftpd` daemon. It usually starts the binary `"bbftpd -s"`, but this can be changed through the `-E` option.

The first command is to pull a file from a remotehost using *get* and the second command is to push a file to the remote host using *put*.

```
./bbftp -s -u remote_username -e 'get filename' remotehost
./bbftp -s -u remote_username -e 'put filename' remotehost
```

- Multiple streams:

**For transfers between two NAS hosts, such as Pleiades and Lou, no more than 2 streams should be used.**

For transfers between your site and NAS, more streams will probably help. In several tests, using 8 streams gave the best performance.

If there is little increase in the transfer rate from single stream to multiple streams, a lower number may be used. The value must be changed in both the control command (-e) and the server command (-E) so that the server listens for the same number of streams as the client requests.

In the examples below, -s is not used. Instead, -E 'bbftpd -s' is used to use ssh to remotely start a bbftpd daemon.

```
./bbftp -u remote_username -e 'setnbstream 8; get filename'
-E 'bbftpd -s -m 8' remotehost
./bbftp -u remote_username -e 'setnbstream 8; put filename'
-E 'bbftpd -s -m 8' remotehost
```

For formatting issue, each command above was broken into two lines. In reality, it should be just one line.

- *File related commands*

You may need to use the command 'cd' to change directory on the remotehost or 'lcd' to change directory on the host where bbftp is issued in order to 'get' or 'put' files from/to the directory you intend to use. For the rules, please see the man page of bbftp. Here are some examples:

```
bbftp -s -u remote_username
-e 'cd /u/username/abc; get filename' remotehost
bbftp -s -u remote_username
-e 'cd /u/username/abc; lcd def; put filename' remotehost
```

For formatting issue, each command above was broken into two lines. In reality, it should be just one line.

- *Initiating bbftp from a host outside of NAS domain*

If you want to initiate bbftp from a host that is not within the NAS domain to transfer files to/from a NAS host (not including dmzfs1 and dmzfs2), you must do the following:

Set up SSH passthrough.

In the `./ssh/config` file on your localhost, be sure to include entries with the **fully-qualified domain name**. For example:

```
Host pfe1.nas.nasa.gov
ProxyCommand ssh sfel.nas.nasa.gov /usr/local/bin/ssh-proxy pfe1.nas.nasa.gov
```

In the bbftp command line, use the **fully-qualified domain name** (ex: pfe1.nas.nasa.gov) of the NAS host. For example,

```
your_localhost% ./bbftp -s -u nas_username -e 'get filename'
pfe1.nas.nasa.gov
```

These two steps are needed due to the fact that bbftp uses 'gethostbyname' function to check a hostname for connection and then it uses ssh to connect to that hostname. Thus a fully-qualified domain name in the `./ssh/config` file is required. If the fully-qualified domain name cannot be found in `./ssh/config`, one will get the error:

```
BBFTP-ERROR-00061 : Error waiting MSG_LOGGED_STDIN message
```

For Pleiades, one has to use pfe[1-12].nas.nasa.gov or bridge[1-2].nas.nasa.gov. The front-end load balancer, **pfe.nas.nasa.gov**, does not work with bbftp. For example:

```
your_localhost% bbftp -s -u nas_username -e 'get filename' pfe.nas.nasa.gov
BBFTP-ERROR-00017 : Hostname no found (pfe.nas.nasa.gov)
```

On the other hand, for ssh or scp, one can use either the fully-qualified domain name above or the abbreviated name below:

```
Host pfe1
ProxyCommand ssh sfel.nas.nasa.gov /usr/local/bin/ssh-proxy pfe1.nas.nasa.gov
```

- Specifying port range

## Performance Tuning

To find the transfer rate, turn on the -V option.

Performance of bbFTP is affected by the number of streams and the TCP window sizes.

The TCP window size determines the amount of outstanding data a transmitting end-host can send on a particular connection before it gets acknowledgment back from the receiving end-host. For optimal performance, the window size should be set to the value of the Bandwidth Delay Product (i.e., the product of the bandwidth of the pipe and the latency).

bbFTP is compiled with a default send and receive TCP window size as can be seen with the -v option and can dynamically adjust the window size (up to the maximum allowed by the system) for better performance. However, a user can also choose a non-default

send/recv window size (in KB). For example:

```
bbftp -e 'setrecvwinsize 1024; setsendwinsize 1024; put filename'
      -E 'bbftpd -s' remotehost
```

For formatting issue, the command above was broken into two lines. In reality, it should be just one line.

For high-speed links where bbFTP is still not performing as well as expected, it may be due to a system windowing limitation. Most operating systems have the maximum window size set to a small value, such as 64 KB. As practice, NAS systems are set to a minimum of 512 KB.

If you are not getting good performance, ask your local system administrator if performance tuning is necessary for your localhost.

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<http://www.nas.nasa.gov/hecc/support/kb/entry/147/?ajax=1>